Nancy Lewis
NOAA's Climate Observation Teacher at Sea
Daily Logs

Day 1: Friday, September 14, 2003

Nuku Hiva, Marquesas Islands, French Polynesia

Personal Log:

I arrived in Nuku Hiva on Friday, September 12, 2003 after flying from Honolulu to Los Angeles, and from there to Tahiti. I spent one night in Papeete, Tahiti, then boarded another flight for Nuku Hiva in the Marquesas Islands, 3 hours by air from Tahiti. From the air I could see many of the other islands and coral atolls that make up French Polynesia, and which are strung out over one thousand miles of ocean. The Marquesas Islands are one of 5 island groups comprising French Polynesia. The other island groups are the Society Islands, the Austral Islands, the Gambier Islands, and the Tuamotus.

The plane landed on the southern end of Nuku Hiva, its landing strip right beside the ocean, as the island rises sharply into craggy peaks affording little flat, coastal ground. I was greeted by Jean Claude, who asked me if I spoke French, as he informed me, in English, that he would be my driver to the village of Taiohae, on the other side of the island.

We soon departed in Jean Pierre's Land Rover, and it was to be a two hour ride over a very rough, unpaved road, definitely a four-wheel drive track. The road wound its way up into the mountains of the interior, and the views were spectacular. One particularly deep valley, almost at the summit, is called the Grand Canyon, and it aptly deserves that name. We bounced over the deeply rutted, twisting dirt road, and I was very glad that the rainy season was past, as I could tell that the road would have been absolutely treacherous under wet conditions. In many places, we were right on the edge of steep precipices, with no protection, but Jean Pierre was an excellent driver.

Along the way I was observing the plants and trees, and saw many that were the same or similar to what we have in Hawaii. We began to descend out of the steep crests of the interior mountains, and passed pastures with cows and horses grazing. All at once we came to a paved road, and Jean Pierre joked that we had reached the "freeway". A young Marquesan waved to us from his horse. A freeway indeed!

Soon the village of Taiohae was laid out below us, nestled around the horseshoe-shaped bay, truly a delightful scene of tropical tranquility. We descended into the village and came to The Pearl Lodge, my accommodations while in Nuku Hiva. The grounds of The Pearl are a botanical garden, carefully tended by Rose Corser, an American woman who started the lodge with her late husband, Frank. The bungalows are built in the Tahitian style, faced with split bamboo, and most tastefully decorated. My lanai faced the bay, and at last, I could have a rest from my long journey, and drink in the serene beauty of Nuku Hiva.

In the afternoon, needing some exercise after two days of being on an airplane, I rode a bicycle from the lodge to the far end of the village, and stopped at the quay at the end of the harbor. Young men were just coming in on outrigger canoes and there were a number of people from the village there. On my way back to the lodge, I was hailed by some girls from the school, who said "stop" and indicated they wanted to talk to me. They soon brought their teacher over to talk to me in English, as my French is not very good. It was wonderful to meet these young people and to explain why I was on their island.

I had dinner that evening with Rose and Tom Nolan, a scientist representing NASA from the Jet Propulsion Laboratory and who would also be joining the NOAA Ship Ka'imimoana. Tom endeavored to coax Rose into telling some stories from her adventurous past, as evidently she had sailed around the world and certainly had a wealth of tales to tell.

My first day on Nuku Hiva closed with the moon shining brightly over the bay, back-lighting the peaks of the mountains cradling the bay, and with the soft whisper of the surf a lullaby of the island.

Day 2: September 13, 2003

Nuku Hiva, Marquesas Islands, French Polynesia

Despite my intention to catch up some sleep, I woke up for the stunning sunrise across the bay. Because of some dense tropical foliage obscuring my view from the lanai, it was not until I walked over to breakfast that I could see that the NOAA Ship Ka'imimoana had arrived and was anchored peacefully in the bay. My colleague, Tom Nolan, a scientist from NASA, had gone to meet the ship, so I took advantage of this opportunity to steal back to my bungalow and read. I had brought with me a copy of Herman Melville's Typee, which is the semi-biographical account of how he jumped ship on this very island of Nuku Hiva, and escaped over into the next valley to live for a period of time with the notorious Typee natives. I mused on his descriptions of tyrannical sea captains, and inhumane treatment aboard his ship, and dreamed myself of stealing over to Taipivai Valley to visit the very place of his mild imprisonment with the "fierce Typees".

My reveries were soon broken by the arrival of the party from the ship, and soon I was sitting and conversing with Tetsuro Isono, the scientist from Japan who was on board for the first leg of the KA's mission from Honolulu. I also met Diane Bernstein, from the University of South Florida, who is working on calibrating an instrument designed to analyze CO 2 dissolved in the water. It was great to meet these people and all of the other folks who make up the crew of the Kai'mimoana.

The day ended for all of us in a very special way. After dinner, a local dance troupe came and entertained the party with traditional Marquesan dancing and drumming. The young men and girls were decked out in hand made costumes of feathers, beads, and raffia, and they brought out huge homemade drums. The performance was a spirited dance that had the bare, painted chests of the young men glistening with sweat. The only complaint was that the dancing didn't go on all night. I thought again about Melville's time that he spent here on Nuku Hiva. His story helped to fuel the romantic ideas associated with the remote South Sea Islands. I walked back to my bungalow with the scent of tiares wafting down the path, and the moonlight reflecting off the waters of the bay.

Day 3: September 14, 2003

Nuku Hiva: Marquesas Islands, French Polynesia

Personal Log:

A group of us from the Pearl Lodge signed on to make the day long trip back into the interior of the island to see a one thousand foot waterfall. We were to have Jean Pierre, a native Marquesan, as our guide, but first we had to take a boat over to Hakaui Bay to reach the trailhead. Once we reached the mouth of the bay, things got really interesting, with our pilot expertly navigating the moderate sea swells that seemed much bigger from our small craft.

We came well south of the bay passing sheer headlands that plunged right to the sea, and then entered into Hakaui Bay facing a gray sand beach fringed coconut trees, the perfect picture of a wild, tropical beach. As we all gathered on shore to begin the trek, an old Marquesan woman appeared with a dog on a leash, seeming to come out of nowhere. She reminded me of the stories of Pele back home in Hawaii. We soon started our trek, and found the very small village of Hakaui, and Jean Pierre, our Marquesan guide, told us that there had been many people living in this valley until 1942 when a malaria epidemic forced most of the inhabitants to leave. We also met Daniel, a spry Marquesan who'd lived in the village since 1927.

The hike to the waterfall first passed through some of the village's cultivated cleared areas where they were growing bananas, coconuts, and papayas. We soon entered some dense tropical jungle, and were glad for the deep shade provided against the hot sum. We passed many stone foundations of houses, called in Marquesan "papais" , remnants of former human settlement. At one point, I saw a stone tiki sitting on top of one of these papais, and it seemed to be guarding some secret. Although there was a trail, we had to cross the river several times, and so we definitely needed Jean Pierre's services.

Just before reaching the falls, we encountered several hunters on horseback, who had their kill wrapped in cloth and slung over their saddles. A little further on, spiky ramparts of needlelike rocks rose up five hundred feet, and Renault, our other guide, told us that there were the bones of human sacrifices hidden in the clefts of one of the needles.

We soon reached the base of the falls with its sheer cliffs rising up in a narrow gorge that reminded me of certain places in Utah. There was a spacious pool easily accessible, but further back behind some rocks was the pool where the cascade roared down. Several of us jumped into the cold fresh water, and eventually we found a way into the cascade pool, and discovered a hidden grotto behind the rocks. The water was very cold, but invigorating.

After our swim, and a bit of lunch, we started back , but took a slightly different route, arriving at the beach of Hakatea Bay where our boats were waiting. The ride back to Taiohae was exciting, and well, dangerous. The seas had kicked up to between 9 and 12 feet, and we were literally holding on for dear life to stay in the boat as it crashed into one trough and rose up to meet the next: and we had no life preservers! Jean Pierre was in my boat, and a few times had a worried look on his face, but I enjoyed it immensely.

We cruised into the harbor past the KA and piled into the back of an open Land Rover to go back to the lodge. It was satisfying to turn in early after the excitement of our expedition into the interior of the island, and to once again hear the soft sounds of surf at the close of a great day.

Day 4: Monday, September 15, 2003

Nuku Hiva, Marquesas Islands, French Polynesia

Personal Log:

Several of us piled in Rose Corser's Land Rover and were dropped of at the school in Taiohae, where we soon found the principal's office. I was pressed into service as interpreter since the principal did not speak English. We were directed to one of the classes, where Tom Nolan and Tetsuro Isono made a short presentation to the students. "Le professeur" explained a little about the mission of the Ka'imimoana, and I was able to understand a quite bit of what he said. Except for the language being French, I would have thought I was in a classroom in Hawaii.

The students then came outside with us and sang to us in the Marquesan language. With the bay in the background, the KA moored in the harbor, it was one of those "island moments". Our objective today wast definitely one of diplomacy and good will.

Our next stop was the Mayor's office where there was to be a presentation from the Ka'imimoana to the VIP's of Nuku Hiva. The current mayor of Nuku Hiva was there, along with the past 2 mayors, the island Chief, the head of the Gendarmerie (Police) and the French representative for Nuku Hiva. Captain Mark Ablondi presented them with an enlarged satellite photo of Nuku Hiva. Many speeches were made, expressing appreciation for the collaborative work of all the parties in the effort to better understand the world's oceans.

It was now time to take the water taxi out to the Ka'imimoana for the tour given to the VIP's. This was my first time on board the ship, in fact, my first time on board any ship! I joined in the VIP tour of what would be my floating home for the next 2 weeks. After lunch on board, a class of students from the school joined us and I enjoyed trying out my French with them, and just generally enjoying being around the kids. By the time they served ice cream in the mess, several of the crew on board had become celebrities, signing autographs and the subject of many 14 year old girls' giggles.

For the last night on Nuku Hiva almost the entire crew went out for pizza after saying our goodbyes to Rose and Diana, the manager of The Pearl. It was nearly eleven by the time we took the water taxi to the ship, and I was shown to my stateroom. Tetsuro had flown back to the States, and I was taking over his berth on the ship. I must admit that my few hours on board earlier in the day had given me a bit of a queasy stomach, so I regretfully swallowed some dramamine before turning the lights out. We would get underway in the morning continuing the work of the Ka'imimoana near the equator.

Bon nuit and au revoir Nuku Hiva!

Day 5: Tuesday, September 16., 2003
Nuku Hiva, Marquesas Islands, French Polynesia

0815 Anchor Aweigh: Underway

Weather Observation Log: 0100

Latitude: 8 degrees, 56.7' S
Longitude: 139 degrees, 59.1' W
Visibility: 12 nautical miles (nm)
Wind direction: 100 degress
Wind speed: 18 knots (kts)
Sea wave height: 5-6 feet
Swell wave height: 5-7 feet
Sea water temperature: 27.2 degrees C
Sea level pressure: 1013.8 mb (millibars)
Dry bulb temperature: 28.0 degress C
Wet bulb temperature: 23.0 degrees C
Cloud cover: 2/8 Cumulus, Altocumulus

Personal Log:

Today is my first full day on the Ka'imimoana, and we steamed out of the harbor of Nuku Hiva at 8:15 am past the huge rocks that guard both sides of the bay. I was out on the forward deck for much of the morning, admiring the striking coastline of Nuku Hiva as we got underway in what were somewhat rough sea conditions. I took some pictures of the dramatic cliffs that break off sharply down to the sea with not a sign of any human habitation. I was somewhat wistful at departing this very unspoiled island, but thought, perhaps some day I will get to return. After all, I never in my life expected to ever visit such a remote spot as the Marquesas Islands. Off in the distance, so shrouded in mist it seemed almost a mirage, could be faintly discerned another one of the Marquesas Islands, its craggy peaks rising up like castle ramparts in a fairy tale. I remained on deck taking in the salty breeze, but the ship was heaving up and down in seas that were at least 6-9 feet.

I thought I should go back to my stateroom and finish my unpacking and arranging my things, as everything on board a ship has to be "ship-shape", meaning neat, clean and orderly. I was aware that I really wasn't feeling all that well, having developed somewhat of a queasy feeling from the rocking of the ship while in the bay at Nuku Hiva. I went outside a few more times to catch some final glimpses of island we were leaving behind, and it seemed that the seas were definitely rough. Uh, oh, I had heard horror stories about some crew members being seasick for days on end. By this time, I was feeling quite ill. I talked to several "old hands" on board, and several urged me to take it easy, and maybe try and sleep. We were steaming to our destination at 4 degrees South Latitude from Nuku Hiva, which is at 8 degrees South latitude, and so were basically headed north, along the 139th meridian of Longitude. We had no buoy operations scheduled today, so I decided it would be best to just take it easy.

There is nothing worse than being seasick, although I never really got that bad. I took some more Dramamine and hoped for the best. The few times I did get up in the afternoon to go down to the mess for some tea, I saw other crew members, and they were telling me it was unusually rough,
and I was not the only one feeling sick. So there isn't much to tell about today, except that they say that a little seasickness comes with first going to sea until you get your "sea legs". As I turned in for the night, I imagine my face looked a little green, and I was fervently hoping I would get those legs as quickly as possible.

From the Plan of the Day: **Notice: " Secure all items for sea"**
Does that include lunch?

Aloha from the KA!

Day 6: Wednesday, September 17, 2003

Plan of the Day:

0900: Recover/Deploy 5 S 140 W Buoy
CTD after anchor drop
AOML Drifter after buoy flyby

Weather Observation Log: 0100

Latitude: 5 degrees, 2' S
Longitude: 139 degrees, 54.7' W
Visibility: 12 nautical miles (nm)
Wind direction: 090 Degrees
Wind speed: 21 knots (kts)
Sea wave height: 4-6 feet
Swell wave height: 7-9 feet
Sea water temperature: 26.8 degrees C
Sea level pressure: 1012.7 mb.
Dry bulb temperature: 27.1 degrees C
Wet bulb temperature: 23.8 degrees C
Cloud cover: 2/8 Cumulus

Science and Technology Log:
The primary mission of the Ka'imimoana is to service and maintain the TAO/Triton array of weather buoys strung out along the equatorial Pacific Ocean. TAO stands for Tropical Atmosphere Ocean and Triton is the name of the Japanese component of the array. These buoys are jointly maintained by Japan and the U.S. in an effort to better understand how the oceans affect climate and weather, especially in the regions close to the Equator.

Today I was able to observe first hand the entire operation of retrieving and deploying what used to be called the Atlas buoy. They are now designated as TAO buoys. These buoys are placed at strategic points north, south and on the Equator. The first leg of this mission began in Honolulu on August 21, 2003. Honolulu is the home base port for the Ka'imimoana, which I hope you all know means "ocean seeker" in Hawaiian. Tetsuro Isono from JAMSTEC (Japan Marine Science and Technology Center) was on board as part of the Teacher at Sea program for the first leg from Honolulu to Nuku Hiva. You can access his broadcasts on the NOAA Teacher at Sea website. Although he was speaking Japanese, an English translation can be printed out for you to follow. In his broadcasts, Tetsuro interviews many of the scientists on board and introduces much of the equipment and buoys that are used in this project. It would be very helpful for you to view these broadcasts in order to get a working background for the buoys and their operations, but I will also be giving explanations during the project.

The first thing in retrieving the buoy is that is that it is sighted from the bridge of the ship. These are moored buoys, so they remain in position where they are placed. Once the buoy is sighted, the RHIB (Reinforced Hull Inflatable Boat) is lowered from the ship, and a crew is sent out to visually inspect and to remove some of the instruments that would be damaged during the retrieval process. The anemometer, rain gauge, and Patrick Ahearn, the Chief Scientist and one other "volunteer". The buoys are usually very slimy and slippery having been out in the ocean for a period of several months, so climbing on the buoy can be a dangerous affair, especially if there are significant waves and swells.

One of my students has asked the question: "What information is gathered by the buoys?" The buoys gather data constantly on the following: wind speed and direction, air temperature, relative humidity, rainfall, downwelling shortwave radiation, downwelling longwave radiation, barometric pressure, sea surface and subsurface temperature, salinity, water pressure, and ocean currents. You can find more details about the instruments for measuring these variables at this website: http:www.pmel.noaa.gov/tao/proj_over/sensors.shtml. The data is transmitted via NOAA polar satellites and is actually picked up by computers located on Wallops Island. This information is used by scientists all over the world who are studying the Pacific Ocean and its relationship to weather and climate, particularly the El Nino and its opposite La Nina. I will be talking more about these as the cruise progresses.

After the buoy was retrieved, a replacement buoy was deployed. I will be posting pictures on the website of the marine life growing on the bottom of the buoy, and it must be cleaned, painted and otherwise serviced before it is used again. The process of retrieving and deploying a new buoy takes approximately 8 hours, as many meters of cable must be spooled on board, and it is amazing to watch this crew work together to bring it all off. It is a well orchestrated event that I will do more to explain as we go along.

Personal Log:

Today was a full day indeed for me, and thankfully I was over my initial seasickness. The opening act of the morning was my first ride in the RHIB to go out to the buoy. You can see from the weather observations that it was by no means calm seas, so the ride out to the buoy was pretty exciting. I was then put to work helping to spool the Nilspin cable which attaches the mooring to the buoy. The spooling operation takes a long time, and even the ExO (Executive Officer) joins in to help. I observed the entire retrieval and deployment operation, and it basically took the whole day.

After dinner, I began training with Randy Ramey, the Survey Technician in charge of the CTD's. I was actually involved in every aspect of the operation under Randy's expert guidance and Tom Nolan, the scientist from NASA was also on hand. I will save an explanation of the CTD for another day, but this instrument is really fascinating to me.

It has been a long and exciting day, but very satisfying. I am still learning my way around the ship and getting used to the shipboard schedule I would like to invite anyone who is looking at the website to e-mail your questions to me, which I can include the answer to on my daily logs. Before I close, let me pose a question for you: What is the Dopplar effect?

My thanks go out to my colleagues and students at Naalehu Elementary and Intermediate School for helping to make this project a success, and I wish you all a fond Aloha!

Nancy Lewis

Day 7: Thursday, September 18, 2003

Plan of the Day:

0130: 4 S CTD and SOLO

0840: 3 S CTD and AOML

1545: Visit 2 S 140 W Buoy w/CTD and AOML

1800: Shellback Meeting in Main Mess: Shellbacks Only! (If you do not know what a shellback is you are not one)

2345: 1 S CTD and SOLO

Weather Observation Log: 0100

Latitude: 2 degrees,55.3' S
Longitude: 139 degrees,57.2' W
Visibility: 12 nautical miles (nm)
Wind direction: 080 degrees
Wind speed: 16 knots
Sea wave height: 4-5 feet
Swell wave height: 6-8 feet
Sea water temperature: 26.4 degrees C
Sea level pressure: 1012.7 mb
Dry bulb pressure: 26.3 degrees C
Wet bulb pressure: 24.1` degrees C
Cloud cover: 3/8 Cumulus

See Tomorrow's Log for info

Day 8: Friday: September 19, 2003

Plan of the Day:

0700: Recover /Deploy Equatorial ADCP
Recover CO2 Buoy (if there) OR
Deploy CO2 Buoy (if Buoy is missing)

Weather Observation Log: 0100

Latitude: 0 degrees, 0.7' N
Longitude: 140 degrees., 2.3' W
Visibility: 12 nautical miles (nm)
Wind direction: 120 degrees
Wind speed: 21 knots
Sea wave height: 3-5 feet
Swell wave height: 5-7 feet
Sea water temperature: 26.0 degrees C
Sea level pressure: 1011.2 mb
Dry bulb pressure: 26.0 degrees C
Wet bulb pressure: 23.8 degrees C
Cloud cover: 3/8 Cumulus, altocumulus

Science and Technology Log:

The equator! For me as for most people, it has always just been "that line around the globe", but now that I am out here on this project, I realize that the equator defines more than just the northern and southern hemispheres of the earth. It is here that the ocean currents are being intensively studied in order for us to understand the relationship between the oceans and climate. The 1982-83 El Nino was not predicted by scientists, and it had far-reaching, damaging effects on such diverse places as South America and Australia. It was then that NOAA funded the Tropical Ocean Global Atmosphere project that is the TAO/Triton array. Approximately 50 of the buoys are maintained by the U.S. and the other 20 are maintained by Japan. It took 10 years to complete and in essence, it is a 6,000 mile antennae for scientists to monitor conditions in the equatorial Pacific.

Normally, the trade winds blow from east to west, but in an El Nino event, the situation is reversed.
The phenomenon has long been observed by South American fisherman, and usually occurs around the time of Christmas, hence its name which means "Christ child". The great ocean currents are moved by the wind, but around the equator, there are counter, below-sea currents. Instruments in the TAO/Triton array are involved in collecting important data on these below surface currents.

Each TAO buoy is moored to the bottom of the ocean using steel cable surrounded in plastic and railroad wheels are the anchor. At various depths on the Nilspin, temperature sensors called thermistors are strapped to the cable. The cable conducts a signal to the surface of the buoy. These cables can become damaged (by sharks biting them!) or otherwise degraded, and then the signal will be corrupted. Thus, there is the need for the periodic maintenance which is the main mission of the Ka"mimoana.

In addition, some of the buoys are equipped with CO2 sensors, which measure the amount of dissolved CO2 in the water, and which can then be used in studies of global warming. The buoy which we retrieved today stopped working shortly after it was deployed, and it was not known if it had broken free or what had happened. As it turned out, the buoy was there, and has been replaced with a fully functioning buoy. Right now, I am looking at innards of that CO@ sensor, which is in the computer lab and is being analyzed by the Chief Scientist.

Personal Log:

Early this morning, we recovered the ADCP, which is a subsurface buoy. Shortly thereafter, we deployed a new ADCP. ADCP stands for Acoustic Dopplar Current Profiler, and this instrument is used to record data on the below surface currents. I will spend time later discussing this buoy, which looks like a giant orange ball.

I spent much of the day catching up on my daily logs, downloading photos and making several video clips to send to the website. It appears that the hurricane did a number on the East Coast., and we probably will not have email communication until at least tomorrow. I have been very happy to get some good questions from the students at Naalehu School on the Big Island, and I am looking forward to hearing from many more of you next week.

I also spent time today chatting with the Chief Boatswain, Kamaka, a very hard working Hawaiian young man who spreads a lot of aloha wherever he goes. I have invited Kamaka to come to my school when we get back to Hawaii since he is planning to visit the Big Island. His girlfriend is Marquesan and lives on Nuku Hiva.

The sunset this evening at the equator was stunningly beautiful, and there was a rainbow under some misty clouds in the east. I am hoping my photo was able to capture it for you all. We shall remain here at the equator overnight, and I am looking forward to the gentle rocking of the ship once I tumble into my berth later this evening.

Question of the Day: What is the Coreolus effect and how does it relate to winds and ocean currents?

Aloha from the Ka'imimoana!

Nancy Lewis

Day 9: Saturday, September 20, 2003

9/19/03~2015 Deep CTD

0100: pH Profiler

0800: Deploy CO2 Buoy

1600: .5 N CTD

2000: 1 N CTD and SOLO

Weather Observation Log: 0100

Latitude: 0 degrees, 1.9' S
Longitude: 139 degrees, 49.7 W
Visibility: 12 nautical miles (nm)
Wind direction: 120 degrees
Wind speed: 15 knots
Sea wave height: 3-5 feet
Swell wave height: 4-6 feet
Sea water temperature: 26.1 degrees C
Sea level pressure: 1-12.0 mb
Dry bulb pressure: 26.3 degrees C
Wet bulb pressure: 24.0 degrees C
Cloud cover: 48 Cumulus, altocumulus, cirrus

Science and Technology Log:

Last evening there was a deep cast of the CTD to a depth of 4000 meters. Tom Nolan and I packed lots of styrofoam cups that had been decorated by students in mesh bags, as well as several foam wig heads that had been artistically painted by Kamaka. These bags we attached to the CTD. The idea was to see what would happen to these cups when subjected to the pressures of the ocean at that extreme depth. The effect was quite interesting. The cups were scrunched, the heads shrunken, but all in perfect proportion. As you can see from the Plan of the Day, 2 other CTD casts were done today, both at the regular 1000 foot depth.

The pH Profiler is a prototype instrument designed and being tested here by scientists from the University of South Florida, Renate Bernstein and Xuewu (Sherwood) Liu. The purpose of their work is the development of precise, accurate, simple, robust and inexpensive CO2-system measurement procedures for use in global CO2 investigations on NOAA vessels. What they are trying to do is to assess the accuracy, precision and overall performance of the University of South Florida systems compared to the systems used by NOAA over the past 15 years. From what I have gathered so far in talking to these scientists, they are not happy about the performance of their instrument.

Let me address the question of AOML drifters. AOML stands for Atlantic Oceanographic and Meteorological Laboratory, and these are surface drifting buoys which are deployed by simply tossing them off the fantail of the ship. They are tracked by the Argos satellite and provide SST (Sea Surface Temperature) and mixed layer current information. There is a global array of these drifters and they provide ground truth for NOAA's polar orbiting satellite AVHRR SST maps. Please email Craig Engler@noaa.gov or check out http://www.aoml.noaa.gov/ for more information concerning the AOML drifters.

Personal Log:

Before leaving Hawaii, I told all my students that it was going to be extremely hot and humid here at the equator. Surprisingly enough for me, that has not been the case at all. It has been actually quite pleasant outside, and of course, there is always a sea breeze blowing. Inside the ship is sometimes like an icebox, especially in the computer lab which is kept at 70 degrees Fahrenheit.

The ship's doctor, Michelle Pelkey, affectionately known as "Doc" runs the ship's store every evening from 0730 to 0800. Already I have bought a T-shirt and Aloha shirt emblazoned with the NOAA insignia and Ka'imimoana. They also sell soft drinks, popcorn, hats and other sundry items.
Doc is also the ship's recreation director, and has pressed everyone to sign up for tournaments in cribbage, darts, Scrabble, and a card game called Sequence.

My evening tonight was spent doing a CTD cast from start to finish with Tom, my colleague from NASA's Jet Propulsion Laboratory. Tom has written down every step of the procedure, and we were editing his instructions during the entire procedure. Randy must have had a lot of faith in us, because we did the whole CTD cast without his help. The last thing to do on the CTD cast is to hose off the rosette, and I got soaked in the process. Looks like it is a good time to call it a day!

Question of the Day:

What event occurs this year on September 23rd and what is its significance?

Until tomorrow,
Nancy Lewis

Day 10: Sunday, September 21, 2003

Sunrise: 0609
Sunset: 1819

Plan of the Day:

0045: 1.5 N CTD

0445: pH profiler Cast

0700: Recover/Deploy 2 N 140 W Buoy
CTD after anchor drop
AOML after buoy fly by

2230: 3 N CTD and AOML

Weather Observation Log:

Latitude: 2 degrees, 2.2' N
Longitude: 140 degrees, 2.5' W
Visibility: 12 nautical miles
Wind direction: 140 degrees
Wind speed: 15 knots
Sea wave height: 3-4 feet
Swell wave height: 4-6 feet
Sea water temperature: 27.7 degrees C
Sea level pressure: 1012.2 mb
Air Temperature: 26.7 degrees C
Dry bulb pressure: 26.3 degrees C
Wet bulb pressure: 24.0 degrees C
Cloud cover: 2/8 Cumulus

Science and Technology Log:

Several other scientists are utilizing the CTD casts in their projects. The first thing that is done when the CTD is brought to the surface is to collect what we have been calling the "Dickson" sample A .5 liter sea water sample is collected from the surface and then capped using a small bench-top press. These samples are sent to the Scripps Institution of Oceanography in San Diego and are analyzed for dissolved inorganic carbon. This procedure is done by the Survey Technician, and yours truly has learned to do it. Also, scientist Charles Gutter-Johnson , from Bloomsburg University, uses the CTD water samples for the Monterey Bay Aquarium Research Institute research. This involves taking chlorophyll and nutrient samples using a bench-top flourometer. Charles also works to collect barnacles off the retrieved buoys for the Bloomsburg University Barnacle Census.

Tom Nolan from NASA's Jet Propulsion Laboratory has been calibrating his instrument, called the MISR, which stands for Multi-angle Imaging SpectroRadiometer. What Tom is doing is checking this instrument against NASA's satellite in order to check its calibration. The instrument basically looks like a small oblong box, which he points to the sun to get a reading, and then down at the ocean to get another reading. These checks have to be done at precise times in order to catch the satellite in its orbit overhead. The satellite images are used in weather forecasting and tracking of storms, such as hurricane Isabel. Here is the website address for viewing the satellite image of Isabel taken by MISR:
http://www-misr.jpl.nasa.gov. I would love to look at the image myself, but we do not have the internet on the KA.

I would also like to give you a website address where you can view a labeled diagram of a buoy. It is:

http://www.pmel.noaa.gov/tao/images/nexgen.gif. Here is a question for you: why do the buoys measure conductivity? To give you somewhat of a hint, conductivity is actually measuring the salinity of the ocean water. How does salinity relate to ocean currents?

Personal Log:

Today we dedicated the TAO buoy to Naalehu Elementary and Intermediate School! On a large NOAA sticker, I wrote the name of our school, and we had a dedication ceremony where the Captain, John Kermond, our videographer, Tom Nolan and myself signed the sticker. Captain Ablondi and myself then fixed the sticker to the central shaft of the buoy, which is above the water. I am very proud to be a part of the Teacher at Sea program, and be able to share the work on the Ka'imimoana of climate observation. I hope to inspire many of the students at my school, and at schools around the country to a greater interest and study of science, and in particular earth science and oceanography. If we fail to care for the oceans (and it is all one big ocean despite our giving them separate names) we risk upsetting the entire ecosystem of this planet. We need the next generation, those of you in school now, to learn as much as they can about this planet, , the waters that cover 70 % of it, and the atmosphere above us.

We finished filming this afternoon just before sunset, and would like to see who can answer this "brain teaser" of a question: Why does the ocean foam? Even I do not know the answer to this question, and I pose it for all you budding young scientists out there.

The game tournaments have begun, and I just learned how to place the card game "Sequence". Tom is my partner and we won 2 out of 3 games that we played against Nicole Colasacco, the Field Operations Officer (the FOO) and Curt Redman, Engine Utilityman. The championship game will be against Doc and the CO (Commanding Officer), Mark Ablondi. According to Doc, whoever wins the first round will be going down when they play her and the CO. We'll see!

Questions of the Day: Quiz for prizes! First prize will be a Ka'imimoana T-shirt, Second prize a ship's baseball cap, and Third prize a special Ka'imimoana patch. Here are the question:

1. **Name the world's 5 oceans.**
2. **Which one is the largest?**
3. **How many island groups make up French Polynesia and what are their names?**
4. **What is La Nina?**
5. **What does NOAA stand for?**

Kia Orana! (May you live long and be at peace, in Cook Islands Maori language)

Day 11: Monday, September 22, 2003

Sunrise: 0610
Sunset: 1817

0515: 4 N CTD

0900: Shellbacks on bow

1215: Deploy Test Wind Buoy
Repair 5 N 140 W Buoy
SOLO

Weather Observation Log:

Latitude: 4 degrees., 22.7' N
Longitude: 139 degrees, 58.8' W
Visibility: 12 nautical miles (nm)
Wind direction: 160 degrees
Wind speed: 10 knots
Sea wave height: 2-3 feet
Swell wave height: 4-6 feet
Sea water temperature: 28.0 degrees C
Sea level presuure: 1013.0 mb
Dry bulb pressure: 27.8 degrees C
Wet bulb pressure: 24.6 degrees C
Cloud cover: 4/8 Cumulus, altocumulus, cirrus
Air temperature: 27.8 degrees C

Science and Technology Log:

I promised that I would return to a discussion of the ADCP, or Acoustic Doppler Current Profiler. You can see from the Daily Log's Plan of the Day when these were deployed, but they are deployed at the following locations: (0-147 E, 0-165 E, 0-170 W, 0-140 W). On which of these locations did we deploy the ADCP on this leg of the cruise?

These moorings are subsurface, and the data is only available after their recovery. Typically, the depth is 300 meters, and these buoys use the Dopplar effect to gather data on ocean currents at that depth. I have posted several pictures on the website of the ADCP, and to me, it looks like a satellite when it was on board the ship. In the water, it looked like a big orange fishing bobber.

Our buoy ops (operations) are beginning to wind down, and we recovered no TAO buoy today, as you can see from the plan of the day. There was a repair done to the 5 N 140 W buoy. A whole group went out to do that, and used the time while out at the buoy to do a little fishing. Two large fish came back on the RHIB, a yellow-fin tuna and a mahi-mahi. Kamaka was preparing the fish by cutting filets and making poke for tomorrow's lunch.

I'd like to make available for teachers a lesson plan submitted by Suzanne Forehand from Virginia Beach City Public Schools. Because the schools have been closed due to the hurricane, it is not available as yet on the web. Teachers may request a copy from me, and I will send it as an attached file to an e-mail. I would like to thank Ms. Forehand for her collaboration on this project, andI hope that their electricity is restored soon. I look forward to hearing from the students at Plaza Middle School in Virginia Beach.

Personal Log:

Oh, the life of a lowly Wog! Traditionally, those who have crossed the equator at sea for the first time are treated to a variety of secret initiation ceremonies where one is designated a "wog". Shellbacks are those people who have already made the passage, and it is their delight to devise various tortures to inflict on the wogs. The 6 of us on board here were ordered up on the forward deck early this morning, and the fun began. I cannot give away any of these secrets, but suffice it to say that we all got a saltwater shower. From here on until we complete the initiation, we have to wear our clothes in ridiculous ways, and bow and scrape to the honorable shellbacks. At the end of several days of this entertainment for all the shellbacks, we then become a shellback ourselves and will be issued certificates and a card that we will hold on to forever to avoid having to endure the same in the future. In the 19th century this tradition was carried to extremes with such measures as keel-hauling the wogs, and some very servious, life-threatening acts of hazing. It is toned way down from those days, and all is done with a spirit of fun and good humor.

I have been busy looking at the photos I have taken on the digital camera, and of course selecting ones to be sent to Maryland to be posted on the website. There were various glitches today with the computer I am working on, so my work had to be done in fits and starts throughout the day.

Tom and I played 2 games of sequence this evening against the CO and Doc and we won the championship! The competition is fierce around here because the winners get a T-shirt or cap from the ship's store. I guess I'll find out if it was wise to beat the Captain hands down like that. I am scheduled to play him next in Scrabble.

Question of the Day: What is the origin of the word "hurricane"?

Aloha until tomorrow!

Nancy Lewis

Day 12: Tuesday, September 23, 2003-09-25

Sunrise: 0608
Sunset: 1815

9/22/03~2330: 6 N CTD

0615: 7N CTD

1300: 8N CTD

2000: Repair 9 N Buoy W/ CTD

Weather Observation Log:

Latitude: 7 Degrees, 25.3' N
Longitude: 140 degrees, 8.0 W
Visibility: 12 nautical miles (nm)
Wind direction: 170 degrees
Wind speed: 10 knots
Sea wave height: 3-4 feet
Swell wave height: 4-6 feet
Sea water temperature: 28.5 degrees C
Dry bulb pressure: 30.4 degrees C
Wet bulb pressure: 26.3 degrees C
Cloud cover: 5/8, Altocumulus, cirrus
Air Tempterature: 30.4 degrees C

Science and Technology Log:

Previously, I explained that there is other scientific work being done on this cruise. One such project is CO2 and pH analysis. Previous to this, NOAA has been using water samples taken from the CTD, and these samples only come from particular depths, generally every 200 meters. The scientists from the University of South Florida have brought along devices which they are testing in order to work out the "bugs", from these prototypes. They are called SEAS systems, and are lowered in the water column to a depth of 300 meters at a rate of 6 meters per minute to collect pH profile continuously. The advantage of the SEAS system over taking samples from the CTD is that they get a continuous data, not just data from the specific depths tested by the CTD. The data they produce is therefore much more complete and accurate.

In my interview with Dr. Renate Bernstein I asked the question: "Is your work related to studies of global warming?" Her answer was: "absolutely. " The SEAS system is analyzing dissolved CO2 in the ocean water. Normally, the ocean is considered to be a "sink" for CO2 in the atmosphere. Cold water has the capacity to dissolve more CO2 from the atmosphere than hot water. The analogy would be to think of the carbon dioxide in a carbonated soda. If you shake up a cold drink, it doesn't fizz as much. If you do the same thing with a warm soda, it will fizz up much more.

How does dissolved CO2 relate to the pH of the ocean? The carbon dioxide combines with water (H20) molecules in the ocean to produce carbonic acid, which has a higher acidity. Thus water with more dissolved CO2 would have a higher pH value.

Dr. Bernstein explained that there are areas, however, where the ocean is liberating CO2. She said that was what they were seeing from the data they've collected. The water near the equator where cold water upwelling occurs were the places where CO2 was being diffused into the atmosphere. According to Dr. Bernstein, what they were doing on board this vessel was truly "cutting edge science" being done nowhere else in the world. It has been exciting to me and a great honor to share with you some of the science being done on board the Ka'imimoana.

Personal Log:

For the first time on this cruise, the weather has become hot and humid. It was not a pleasant day to be out on the deck of the ship, plus they were power washing the deck and acid cleaning the sides of the vessel. Last night I was out with my Planosphere, trying to identify some constellations, but the clouds had started, so visibility was not that good. I did see Sagittarius, which looks like a teapot. Randy, the Survey Tech in charge of the CTD, showed me a computer program that I want to get called "Starry Night". You put in your location and the time and date, and it shows the night sky and superimposes images over the constellations: very cool!

I almost missed the biggest event of the day, and for me, of this, cruise. John Kermond had told me that the buoy repair was cancelled, so there wouldn't be a last RHIB ride out to the buoy. I had already prepared for bed, when there came a knock at the door. " Hurry up, they're going on the RHIB!" I quickly scrambled on some clothes and ran up to the deck, while Doc hunted up a hard hat and life jacket for me. They strapped a Cyalume light onto my vest, John gave me a flashlight, and we were off. I felt a little like what it must have been like on the Titanic, getting into lifeboats in the inky blackness. We roared off, using a powerful light to see the buoy. The water around the buoy was teeming with large fish, mostly mahi.

This buoy had been damaged and Patrick Ahearn, the Chief Scientist would be making the necessary repairs. Sometimes, they say, other ships hit the buoy, or fishing boats tie up to the buoy. This was the first time the sea had been relatively calm, and it seemed a good thing, since higher seas would make a repair job much more difficult, like working on a bobbing cork. Patrick swung out onto the buoy, follwed by Nicole Colasacco, the Field Operations Officer who would assist him.

In the meantime, we sped back to the KA to pick up replacement instruments, a new rain gauge, a new anemometer, and a new temperature sensor. The ship seemed a long way off, but all of its running lights were on. I thought about how it must have felt for Patrick and Nicole to be all alone in the dark on that buoy while we went back to the ship.

As soon as we returned with the instruments, Jimbo set out fishing lines and we bagan to troll. We spent a good 45 mindutes circling the buoy, but got nary a bite. Maybe it just wasn't feeding time. As our eyes got our night vision, we could see the sparkling of bioluminescent creatures in the water all around the boat. The skies were cloudy, so stargazing was out, and eventually it began to rain.

Finally, they were finished with the repair job, and it was my turn to get out onto the buoy. I already knew that the donut would be slimy and slippery, and it was. There are several platforms, though, that afford good footing inside the bars of the instrument scaffold. By the time I was up on the buoy, the swells had picked up a little, and actually, there was a terrific current pulling on the buoy. It was a little like riding a bucking bronco!

We were out on the buoy operation until well past 11 last night, but I was so glad I hadn't missed my last chance to get on one of the buoys. The fish weren't biting, so we came away empty handed, but they'll be other fishing opportunities as we start the long transit back to Honolulu. Since we have to go right past South Point on the island of Hawaii, there is a chance that students from my school may get to see us, and I'll keep you posted on exactly when that will be.

Question of the Day: What is the chemical formula for carbonic acid?

Aloha from the KA!
Nancy Lewis

Day 13: Wednesday, September 24, 2003

Sunrise: 0613
Sunset: 1828

0600: All wogs on bow

Transit to Honolulu

Time Change: Set your clocks back one hour to Hawaii time

Weather Observation Log: 0100

Latitude: 9 degrees, 57.8; N
Longitude: 141 degrees, 41.6' W
Visibility: 12 nautical miles (nm)
Wind direction: 130 degrees
Wind speed: 7 knots
Sea wave height: 2-3 feet
Swell wave height: 4-6 feet
Sea water temperature: 27.8 degrees C
Sea level pressure: 1012.2 mb
Dry bulb pressure: 27.0 degrees C
Wet bulb pressure: 26.0 degrees C
Cloud cover: 7/8 Altocumulus, cumulus, altostrattus
Air temperature: 27.0 degrees C

Science and Technology Log:

The phenomenon known as El Nino will be the subject of our discussion today. El Nino is a recurrent weather phenomenon that has been known for years by fisherman along the coasts of South America. During an El Nino, the normally strong easterly tradewinds weaken, bringing warmer than normal currents eastward to the the coasts of Peru and Ecuador. Fishing drops off, and there can be catastrophic effects in weather all the way from Australia and Indonesia to both American continents.

During the unpredicted El Nino of 1982-83, the effects began to be felt in May. West of the dateline, strong westerly winds set in. Sea levels in the mid-Pacific rose several inches, and by October, sea level rises of up to one foot had spread 6000 miles east to Ecuador. As the sea levels rose in the east, it simultaneiously dropped in the western Pacific, destroying many fragile coral reefs. Sea temperatures in the Galapagos Islands rose from the low 70 degrees Fahrenheit to well into the 80s. Torrential rains on the coast of Peru changed a dry coastal desert into a grassland. Areas from Ecuador, Chile and Peru suffered from flooding as well as fishing losses, and that winter there were heavy storms pounding the California coastThe rains that normally fall in Indonesia and The effects of this El Nino to the world economy were estimated to be over $8 billion.

During the 1920s, a British scientist, Sir Gilbert Walker, pioneered work in what he called the Southern Oscillation Index.. Using data from barometric readings taken on the eastern and the western sides of the Pacific Ocean, Gilbert discovered that when the pressure rises in the east, it falls to the west, and vice-versa. When the pressure is in its high-index, pressure is high on the eastern side. The pressure contrast along the equator is what drives surface winds from east to west. When the pressure is in the low index, the opposite condition occurs. Easterly winds usually disappear completely west of the dateline, and weaken east of that point.

The TAO/Triton array is part of an international effort to be understand, in order to be able to predict and prepare for such events as El Nino and its counterpart, La Nina. Formerly, data was collected from historical records, instruments at tide gauging stations, and also the observations made by ships transiting the ocean. The data that is being collected will be able to help scientists hone their understanding of the complex relationship between the atmosphere and the oceans. We have only recently become aware of the profound effects that climate changes in far

flung points on the globe have for many parts of the inhabited world. It is a sobering fact to realize that oceans cover 71% of our planet, and that, next to the sun, the oceans are the biggest determinant of climate and weather.

Personal Log:

The buoy operations are over and we are now steaming our way back to the KA's home port of Honolulu. The ship is basically moving at approximately 10 miles an hour, so in 10 hours, we only travel 100 miles. Our estimated time back is sometime Sunday evening.

Fishing lines have been set out off the fantail, and the crew is beginning to clean up the gear, power washing the deck and acid cleaning the sides for our grand entry back in Hawaii. Tonight in the mess lounge, we had the "wog Olympics" where we competed in such races as rolling olives on the floor with our noses.

My usual routine has calmed down a bit, but we are still making videos. Some of them have to be tossed and redone if I flub my lines too much. It was raining today, the sky a mass of almost evil-looking clouds.
We also had periods of rain and drizzle. I paid a visit to the bridge asking for any old navigation charts, and came away with a bundle.

I am also busy rehearsing my "act" for tomorrow night's performance on the fantail after a barbecue dinner. We wogs are expected to provide the evening entertainment for the honorable shellbacks.

Tonight for the first time, I watched some television. We have programming provided by the Armed Forces Network. I'd like to take this opportunity to send my best wishes for a safe return to all those men and women serving in the current conflict in the Middle East, and most especially to PFC Noel Lewis and all those in his unit.

Question of the Day: What is the difference between weather and climate?

Aloha from the KA!
Nancy Lewis

Day 14: Thursday, September 25, 2003

Transit to Honolulu, HI: Approximate arrival: evening of 9/28//2003

1600-1700: Fantail BBQ

1800: Wog Talent Show

Weather Observation Log: 0100

Latitude: 12 degrees, 29.6' N
Longitude: 145 degrees, 30.0' W
Visibility: 12 nautical miles
Wind direction: 120 degrees
Wind speed: 9 knots
Sea wave height: 3-4 feet
Swell wave height: 5-7 feet
Sea water temperature: 28.0 degrees C
Sea level pressure: 1013.4 mb
Dry bulb pressure: 28.0 degrees C
Wet bulb pressure: **25**.7 degrees C
Cloud cover: 6/8 Cumulus, cirrus

Science and Technology Log:

Yesterday, I asked the question: "What is the difference between climate and weather?" Understanding the distinction is important, and is often confused by students, who often hear the two terms used interchangeably.

Very simply, weather is what is happening at any given moment in terms of temperature, rainfall, winds, humidity and storms. We all know that the weather can change from hour to hour and day to day. Climate, on the other hand, is the overall weather pattern and conditions for a given area or region over a period of time. Thus, we may say the climate for large areas of the continental U.S. is temperate, while the climate of Pacific islands is tropical. The Big Island of Hawaii, with its two 13,000 foot mountains, has at least 9 climate zones.

We know that the earth has undergone times in its past of major climate change. At one time, the polar ice extended down into areas of the United States that today are ice free. We know that even very small changes in ocean temperatures can create conditions that have far-reaching effects around the world. Scientists are still attempting to understand the interaction of the atmosphere and oceans in order to be able to better predict and prepare for climate changes. The climate observation system provided by the TAP/Triton array and maintained by the Ka'imimoana is an important link in the global effort to completely understand the complex relationships between air, sea, land, and human actions and how these affect climate and weather.

Personal Log:

Today I spent a lot of time preparing for the Wog Talent Show, in addition to answering my email and writing this log. I thought I would share with you part of my little act, which was a dramatization of the Legend of Fenua Enata, the creation myth of the Marquesas Islands. It was set to some very nice island music from the island of Rarotonga, in the Cook Islands.

The buoy that was dedicated to Taiohae School was painted and named by the students: **" Fenua Enata",** which they told me was their word for their islands. The term "Marquesas" was the name given to the islands by the first European to come to Fenua Enata.

Legend of the Fenua Enata

A long time ago, when the sun was shining on the sea, the first man, Atea and the first woman, Atanua had no house.
So Atanua told Atea: "We do not live well without a house". Atea did not answer.
He thought: "I do not know how to build a house."
Then he thought, "I have the divine power of the Mana. I will ask the gods."

One evening Atea said to his wife Atanua:
"Tonight I will build you a home. I know how."
It was dark and Atea's voice was like a spell singing in the silent nothingness:

AKA OA E, AKA POTO E, AKA NUI E, AKA ITI E E
E E, AKA PITO E, AKA HANA E, HAKA TU TE HAE

The spell was finished, the work began, the site was chosen in the middle of the ocean.

Two sturdy posts were erected: these became **UA POU**
A long beam was placed on top of them; it became **HIVA OA**
The front posts and the rafter covering the roof was **NUKU HIVA**
Nine woven coconut palm leaves, laid end to end as thatch became **FATU IVA**

The weaving of the thatch took a long time as did the making of the sennit.
Time passed quickly as Atea worked and worked without stopping.

Suddenly Atanua shouted: "O Atea e,
The light of dawn is turning the sky to red": it is **TAHUATA**

"O Atea e, Moho, the morning bird just sang":
It is **MOHOTANI**

Atea kept digging a hole for the litter of fronds, sennit and hau bark,
Until finally he said: "This is **UA HUKU**".

Then the sun lit up the sky illuminating the ocean and the new dwelling place.
Atanua cried out: "Ir is **EIAO**".

Thus, the Land of Men, **Fenua Enata**, was created.

Question of the Day: What is the thermocline?

Aloha from the KA,
Nancy Lewis

Day 15: Friday, September 26, 2003

Transit to Honolulu, HI

0700: Wog Breakfast

Sunday night arrival at Hotel pier, Pearl Harbor
Monday morning: clear Customs/Immigrations/Agriculture
Refuel, then depart approximately 1500 for Snug Harbor

Weather Observation Log: 0100

Latitude: 14 degrees, 54.7' N
Longitude: 149 degrees, 22.4' W
Visibility: 12 nautical miles
Wind direction: 090 degrees
Wind speed: 10 knots
Sea wave height: 3-4 feet
Swell wave height: 5-7 feet
Sea water temperature: 28.0 degrees C
Sea level pressure: 1012.7 mb
Dry bulb pressure: 27.8 degrees C
Wet bulb pressure: 24.9 degrees C
Cloud cover: 6/8 Cumulus, strato-cumulus

Science and Technology Log:

Last night I was able to interview the Chief Scientist on board the KA, Patrick Ahearn. Patrick's responsibilities include assembling and diaassembling the buoy components, working with the Captain to map out the buoy operations each day, and also overseeing all the other science projects that are being done on board the KA.

I have received several e-mail questions from students about whether or not they ever put out new buoys. Research and developments is always going on with the TAO/Triton program. Patrick talked about several experimental instruments that were used for the first time on this cruise. A new buoy was deployed (parallel with the one at 5 degrees North) that had on it a new type of wind strument called an Acoutstic Wind Anemometer. This will be a test buoy to see how it performs compared with the older propellar type model, which is greatly subject to damage.

Another experimental device just deployed for the first time on this cruise is called a pCO2 unit. This unit has been laying out here in the lab, opened up, and we are shooting some video footage of it, so that you can see what it looks like. It is pretty amazing in that inside the waterproof canister are various transistors, wiring, and an iridium modem phone which they use to call up the buoy. Another canister contains lots and lots of batteries to power the instrument.

The pCO2 unit is being used to measure the amount of carbon dissolved in the water. It will enable data to be gathered on the amount of carbon dioxide that is either being dissolved into the ocean, or being diffused out of the ocean water and into the atmosphere. These studies are very important to the study of the greenhouse effect and relate to studies that are considering whether or not global warming is indeed occurring. It was truly gascinating to see the inside of this sophisticated instrument, another example of the type of cutting edge science being conducted on board this vessel.

Patrick is the one who always goes out to the buoys, climbs on them to remove the instruments before the buoy is retrieved, or brought on board the ship. On the night that I rode out to the buoy where a repair would be conducted, I was amazed to see Patrick bring onto the buoy a laptop computer. You can imagine how it must have looked, in the pitch dark, with him gazing at the lighted computer screen *on the buoy*.

Personal Log:

All of the Wogs had to serve breakfast to the Shellbacks this morning. I have been sworn to secrecy about the exact nature of the rest of the morning's proceedings. The initiation of Wogs is a tradition that goes way back to the days of sailing ships, but nothing that happened to us was injurious to life or limb. suffice it to say, that I survived the treatment and was rewarded with a card that proves I have been across the Equator, and am now an honorable Shellback.

The scientists are beginning to pack up all their instruments and gear. Tom Nolan is still running calibrations with his SINBAD instrument whenever the satellite is overhead. The crew has been busy cleaning the decks, painting and generally sprucing up the ship for our grand entrance into Pearl Harbor on Sunday. The Customs officials have to clear us, since the ship has been to a foreign country. Then, the ship will refuel and make its way over to Snug Harbor. Many of us will be leaving the vessel, but for much of the crew, a new cruise will begin for them after not too many days.

In the meantime, I am keeping track of our projected time to approach Ka Lae, or South Point, the southernmost tip of land in the U.S. My school, Naalehu Elementary and Intermediate School, is located very close to South Point, and indeed, the school overlooks the ocean near there. It may be in the middle of the night, but I am planning on being, no matter what time it is.

Question of the Day: Where is the ozone layer located in the atmosphere?

Aloha from the KA,
Nancy Lewis

Day 16: Saturday, September 27, 2003

Transit to Honolulu, HI

Sunday night arrival at Hotel pier, Pearl Harbor
Monday morning: clear Customs/Immigrations/Agriculture
Refuel, then depart approximately 1500 for Snug Harbor

Weather Observation Log: 0100

Latitude: 17 degrees, 18.4' N
Longitude: 153 degrees, 17.5' W
Visibility: 12 nautical miles
Wind direction: 080 degrees
Wind speed: 14 knots
Sea wave height: 3-4 feet
Swell wave height: 5-7 feet
Sea water temperature: 26.8 degrees C
Sea level pressure: 1013.5 mb
Dry bulb pressure: 27.2 degrees C
Wet bulb pressure: 25.0 degrees C
Cloud cover: 1/8 Cumulus, alto-cumulus

Science and Technology Log:

Today I will try and summarize for you the" El Nino Southern Oscillation Diagnostic Discussion" that was forwarded to me by Captain Ablondi of the Kai'imimoana. This report was issued by the Climate Prediction Center.

Current atmospheric and oceanic conditions are near normal and do not favor either the development of El Nino or La Nina. Sea surface temperature anomalies of +0.5 degrees Celcius were noted west of the International Dateline, but there were near-zero anomalies in the equatorial Pacific east of 150 degrees West longitude. During August, very little SST anomalies were observed in the El Nino regions.

In May there were gains in upper-ocean temperature which spread eastward into the central and eastern Pacific. This was associated with an eastward Kelvin wave, that resulted from weaker than average easterly tradewinds that occurred in May and June. SST (Sea Surface Temperatures) anomalies increased during June and July, but then subsided during dAugust.

The Tahiti-Darwin SOI (Southern Oscillation Index) showed a great deal of month to month variability, but shows no trend towards the development of either El Nino or La Nina.

Most of the statistical forecasts display near neutral conditions for the remainer of 2003 and 2004. This forecast is consistent with the trends revealed by all other coeanic and atmospheric measurements and data.

I have copies of the graphs associated with the above report, and would be happy to make them available to any classes, students or teachers upon request.

Personal Log:

Today everyone is readying for our arrival tomorrow night into Pearl Harbor. Accounts with the ship's store are being squared up, and some of the computers are having operating systems reinstalled. Most of us are starting to pack. I am still answering e-mails, cataloguing photos and catching up with my daily logs.

The real treat came just at sunset after dinner. The Big Island was visible from our position of 100 miles away. Mauna Loa showed clearly on the horizon, and I thought I could even see Kilauea off to the east. It was an exceptionally clear evening, but in spite of that, we saw no "green flash". I was really excited to get my first glimpse of land in so many days, and be able to see my much loved mountain. One other crew member, Curt, also lives on the Big Island, and we joked that we could probably jump ship and swim home.

The prediction is that we will pass by South Point around 2 in the morning. I plan to be on the bow!

Question of the Day: What is phytoplankton?

Land Ho!

Nancy Lewis